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Microscopical Observations of Mr. Leewenhoeck, concerning the Optic Nerve, communicated to the Publisher in Dutch, and by him made English.

Having acquainted Dr. Schravesande, that I could perceive no cavity in the *Optic Nerve*, he told me, that *Galen* had on a clear Sun-shiny day seen a hollowness therein, encouraging me to view that Nerve again with more attention.

I took therefore, afresh, eight distinct *Optic Nerves*, and observed, that after those Nerves had been but a little while cut off from the Eye, the filaments, of which they are made up, did shrink up, which shrinking cannot be so much on the external surface or coat of the Nerve, as 'tis of the filaments that lie within the same: And upon this shrinking up, a little pit comes to appear about the middle of the Nerve; and 'tis this pit in all probability, that *Galen* took for a cavity. This I have remarked on all occasions.

Having lately viewed again an *Optic Nerve*, I not only saw the lately-mentioned little pit, but noted also several other places sunk in, as if each filament had been in the midst drawn inwards, after the manner by me described elsewhere.

I have also found, that this Nerve, when I let it be dried, was $\frac{2}{3}$ less in thickness than before; so much of it being dried away.

These Observations invited me to endeavour to dry an *Optic Nerve*, and to take care, that the same in its drying all at once, might retain (as much as was possible) the same roundness and thickness all over, as the Nerve had when it was first taken out of the Eye; considering that if there were a hollowness in it, it would then discover it self.

Having then dried such a *Nerve*, and made a transverse segment thereof, I not only saw in it a hole, but very many, which made it resemble a Leather Sive, wherein are big and small holes, only with this difference, that the holes in the Nerve were not round (no more than they are not all of the same bigness) nor so regularly posited by one another, as the holes in a Sive are: But this piece of the *Optic Nerve*, together with the holes therein, is more like a piece of Parchment in which are made holes close unto one another, and the same moistned, and so stretcht out, whereby the holes in the Parchment keep not that roundness, which they had before moistening. These holes or cavities being in the dried Nerve, I am

of the same opinion still (as I was before) that the nerve or fibres are made up of soft fluid globuls, and that these globuls by drying the Nerve are most of them exhaled.

I here thought with my self, whether every one of these hollownesses might not have been a filament in the Nerve; and besides, that 'twas needless, there should be a cavity in the *Optic Nerve*, through which the Animal Spirits, representing the species or images in the Eye, might pass into the brain. But I imagined it might be performed, for example, after this manner; viz. I represent to my self a tall Beer-glass full of Water: This Glass I imagine to be one of the filaments of the *Optic Nerve*, and the Water in the Glass to be the globuls of which the filaments of that Nerve are made up, and then, the Water in the Glass being toucht on its surface with the finger, that to this contact did resemble the action of a visible object upon the Eye, whereby the outermost globuls of the fibres in the *Optic Nerve* next to the Eye are toucht. This contact of the Water made by the finger cannot be said to touch and move only the surface of the Water, but we must also grant, that all the water in the Glass is moved thereby, and that even the bottom of the Glass comes to suffer, and to be more press'd by it, than it was before the finger touched the Water, and that also all the parts of Water are moved thereby. This motion then of the Water, said to be made by the contact of the finger, I imagine to be like the motion of a visible object made upon the soft globuls, that lie at the end of the *Optic Nerve* next the Eye, which outermost globuls do communicate the like motion to the other globuls so as to convey it to the Brain.

I have put before my Microscope a piece of such a dried *Optic Nerve* of a *Cow*, and how it appeared, you will see by the picture hereby transmittid unto you.

A, B, C, D is the circumference of the *Optic Nerve*, which did not dry round-ways, but somewhat oblong on the side *C, D*.

E, and all the places that are left white and lucid, are cavities in the dried Nerve, and which I imagine to have been filaments, and out of which, for the greatest part, the soft globuls have been exhaled.

F, are particles or globuls, which are in the little holes of the filaments in many places, and such as have not been exhaled: Of which some do lie on the side of the hollownesses, others lie round

about a cavity, others lie cross a cavity, as G. All these particles were eminently transparent.

About A, B, C, D, there are near the edge of the Nerve some transparent winding strokes.

Other Microscopical Observations, made by the same, about the texture of the Blood, the Sap of some Plants, the Figure of Sugar and Salt, and the probable cause of the difference of their Tasts.

In my former I told you, how that the clearer aqueous matter of the Blood, being that Liquor in which the red sanguineous globuls swim, doth likewise consist of globul's; and that I had observed such in that aqueous matter, when the moisture was somewhat, or for the most part, exhaled. But now I cannot omit to acquaint you, that a few daies after I had sent away that Letter, I saw the plain globuls move in that waterish matter without any evaporation made; though there were but very few of them, and they appeared white where they lay together. And on this occasion I very well remember, that, about two years ago, I divers times observed my own Blood, and noted, that those sanguineous globuls that make the Blood red, seemed then to be firmer and harder than they are in my Blood now; at which time my Body was very much indisposed, so that I fell into a sickness, which held me near three weeks: But now I find those globul's of my Blood softer, and more sticking to one another, and my Body in a good state of health. I know not, whether some sicknesses, and even death it self, may not sometimes proceed from the hardness of those globul's. I am apt to imagine, that those sanguineous globul's in a healthy Body must be very flexible and pliant, if they shall pass through the small capillary Veins and Arteries, and that in their passage they change into an oval figure, reassuming their roundness when they come into a larger room.

Besides this, I have observed in the clear matter of the Blood figures of a quadrangular form, which I suppose to be some saline parts; further to be examined hereafter.

But I shall proceed to give you an account of the Observations I have made of the Sap of some Plants. *Arum* (*Wake-robin*) being tasted by me, and found very sharp upon the tongue, I found by my Microscope, that the Leaf thereof did consist of globul's not exactly round, and these again of particles incomparably smaller

Fig. 1.

